

CLAIMS

What is claimed is:

- 5 1. A magnetic memory fabricated on a semiconductor substrate comprising:
a plurality of magnetic tunneling junctions, each of the plurality of magnetic
tunneling junctions including a first ferromagnetic layer, a second ferromagnetic layer and
an insulating layer between the first ferromagnetic layer and the second ferromagnetic layer;
and
10 a plurality of shields for magnetically shielding the plurality of magnetic tunneling
junctions, at least a portion of the plurality of shields having a high moment and a high
permeability and being conductive, the plurality of shields being electrically isolated from
the plurality of magnetic tunneling junctions, the plurality of magnetic tunneling junctions
being between the plurality of shields.
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2. The magnetic memory of claim 1 wherein a first shield of the plurality of
shields includes a first magnetic layer having a first easy access and a second magnetic layer
having a second easy axis perpendicular to the first easy access.
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3. The magnetic memory of claim 2 wherein a second shield of the plurality of
shields includes a third magnetic layer having a third easy access and a fourth magnetic
layer having a fourth easy axis perpendicular to the fourth easy access.

4. The magnetic memory of claim 1 wherein the plurality of shields include FeTaN.
5. The magnetic memory of claim 1 wherein the plurality of shields include FeAlN.
6. The magnetic memory of claim 1 wherein the plurality of shields include FeCrN.

10 7. The magnetic memory of claim 1 wherein the plurality of shields include a material having a saturation magnetization of greater than or equal to 850memu/cm³.

15 8. The magnetic memory of claim 1 wherein the plurality of shields include a material having a saturation magnetization of greater than or equal to 1750memu/cm³.

9. The magnetic memory of claim 7 wherein the material has an anisotropy field of less than or equal to thirty Oe.
10. The magnetic memory of claim 7 further comprising:
20 a plurality of semiconductor device coupled to the plurality of magnetic memory cells and residing between the plurality shields.
11. A method for providing a magnetic memory on a semiconductor substrate comprising the steps of:

(a) providing a plurality of magnetic tunneling junctions on the semiconductor substrate, each of the plurality of magnetic tunneling junctions including a first ferromagnetic layer, a second ferromagnetic layer and an insulating layer between the first ferromagnetic layer and the second ferromagnetic layer;

5 (b) providing an insulating layer on the plurality of magnetic tunneling junctions;

(c) providing a plurality of shields for magnetically shielding the plurality of tunneling junctions, at least a portion of the plurality of shields having a high moment and a high permeability and being conductive, the plurality of shields being electrically isolated from the plurality of magnetic tunneling junctions, the plurality of magnetic tunneling junctions being between the plurality of shields.

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12. The method of claim 11 wherein the shield-providing step (c) further includes the steps of:

(c1) providing a first shield on the semiconductor substrate; and

15 (c2) providing a second shield on the insulating layer.

13. The method of claim 12 wherein the first shield providing step (c1) further includes the steps of:

(c1i) providing a first magnetic layer having a first easy access; and

20 (c1ii) providing a second magnetic layer having a second easy axis perpendicular to the first easy access.

14. The method of claim 13 wherein the second shield providing step (c2) further includes the steps of:

(c1i) providing a third magnetic layer having a third easy access; and
(c1ii) providing a fourth magnetic layer having a fourth easy axis perpendicular to the third easy access.

5 15. The method of claim 11 wherein the plurality of shields include FeTaN.

16. The method of claim 11 wherein the plurality of shields include FeAlN.

17. The method of claim 11 wherein the plurality of shields include FeCrN.

10 18. The method of claim 11 wherein the plurality of shields include a material having a saturation magnetization of greater than or equal to 850memu/cm³.

15 19. The method of claim 18 wherein the plurality of shields include a material having a saturation magnetization of greater than or equal to 1750memu/cm³.

20. The method of claim 18 wherein the material has an anisotropy field of less than or equal to thirty Oe.

20 21. The method of claim 11 further comprising the step of:
(d) providing a plurality of semiconductor device coupled to the plurality of magnetic memory cells and residing between the plurality shields.